CLAIMS

What is claimed is:

1. A method of varying the inductance of a passive inductor, wherein the passive inductor comprises a first inductor and a second inductor magnetically coupled by a coupling factor k, the method comprising:

generating a first current through the first inductor;

generating a second current through the second inductor; and

varying the magnitude of the second current, wherein varying the magnitude changes the effective impedance of the passive inductor.

2. The method of Claim 1, wherein the first current is the primary current and the second current is the secondary current.

3. The method of Claim 1, wherein the phase difference between the first and second current is approximately zero or 180°.

4. The method of Claim 1, further comprising varying the phase difference between the first and second currents to change the effective impedance.

5. The method of Claim 1, wherein the coupling factor k is fixed.

6. The method of Claim 1, wherein the magnitude of the signal is varied between +1 and -1.

7. The method of Claim 1, wherein the effective inductance is given by $L_{eff} = L_1 + CMe^{j\theta}$, wherein L_1 is the

self inductance of the first inductor, C is the magnitude scaling factor, M is the mutual inductance of the first and second inductors, and θ is the phase difference between the first and second current.

8. The method of Claim 1, wherein the first and second current are at the same frequency.

9. The method of Claim 1, wherein the first and second inductors are coils.

10. A programmable passive inductor, comprising:

a first inductor; and

a second inductor magnetically coupled to the first inductor with a coupling factor, wherein the relative magnitude of the currents through the first and second conductors is varied to change the effective impedance of the passive inductor.

11. The passive inductor of Claim 10, wherein the first and second inductor are coils.

12. The passive inductor of Claim 11, wherein the relative magnitude is varied by changing the magnitude of the current through the second inductor, wherein the first inductor is a primary coil and the second inductor is a secondary coil.

13. The passive inductor of Claim 10, wherein the effective inductance is given by $L_{eff} = L_1 + CMe^{j\theta}$, wherein L_1 is the self inductance of the first inductor, C is the magnitude scaling factor, M is the mutual inductance of the first and second inductors, and θ is the phase difference between the first and second current.

14. The passive inductor of Claim 13, wherein the phase difference is approximately zero or 180°.

15. The passive inductor of Claim 13, wherein self inductances of the first and second inductors are approximately the same.

16. The passive inductor of Claim 10, wherein the coupling factor and self inductances of the first and second inductors are fixed.

17. The passive inductor of Claim 13, wherein the phase difference is varied to change the effective impedance.

18. An amplifier circuit, comprising:

a first multiplier configured to receive input signals, wherein the first multiplier multiplies the signals with a constant;

a second multiplier configured to receive the input signals, wherein the second multiplier multiplies the signals with a variable factor C;

a first differential amplifier coupled to receive output signals from the first multiplier, wherein the first differential amplifier comprises a first and a second inductor in parallel and provides an output for the circuit; and

a second differential amplifier coupled to receive output signals from the second multiplier, wherein the second differential amplifier comprises a third and a fourth inductor in parallel, wherein the first and third inductors are coupled with a

coupling factor k and the second and fourth inductors are coupled with a coupling factor k.

19. The circuit of Claim 18, wherein the input signals are alternating currents.

20. The circuit of Claim 18, wherein the variable factor C is varied to change the effective impedance of the circuit.

21. The circuit of Claim 18, wherein the first and second multipliers and the first and second differential amplifiers are the same.

22. The circuit of Claim 18, wherein the constant is unity.

23. The circuit of Claim 18, wherein the first differential amplifier further comprises:

a first voltage source coupled to the first and second inductors;

first and second resistors coupled in series to the first and second inductors, respectively;

first and second transistors coupled in series to the first and second resistors, respectively; and

a first current source coupled to the first and second transistors, wherein the output is between the first resistor and transistor and the second resistor and transistor;

and the second differential amplifier further comprises:

a second voltage source coupled to the second and third inductors;

third and fourth resistors coupled in series to the third and fourth inductors, respectively;

third and fourth transistors coupled in series to the third and fourth resistors, respectively; and

a second current source coupled to the third and fourth transistors, wherein the output is between the third resistor and transistor and the fourth resistor and transistor.